

UDC 338.46

Kitonsa Haula,

Postgraduate student,

Graduate School of Economics and Management,

Ural Federal University

named after the first President of Russia B.N. Yeltsin

Ekaterinburg, Russian Federation

ONLINE SHOPPING AND DRONE TECHNOLOGY IN RUSSIA

Abstract:

As the escalation of online shopping toils its capacity in Russia, the effectiveness of last mile delivery has gained total attention since it is one of the core phase of an effective transaction via online shopping. Last mile delivery is facing a series of stumbling blocks of which the main ones are; poor infrastructure in rural and disaster-stricken areas and extreme climate condition (winter) hence forcing companies, to incur more the costs at this stage than any other stage. The emerging drone technology with tremendous anticipated applications of which one is delivery, may be the ultimate solution to cutting down costs and ease on the difficulties of last mile delivery. However, like any other technological innovation, drone technology is associated with uncertainties which are regarded as risks, several technical and societal concerns and challenges that need to be addressed. The goal of this review paper is to analyze the feasibility of drone technology in last mile delivery by carrying out its SWOT analysis and point out risks that may arise once deployed to delivery. And carry out a comparison between the current legal framework in Russia with that of major international key players in the technology in order to find out the loop holes and possible steps necessary to be taken towards regulating drone delivery in Russia.

Keywords:

Drone technology, Last mile delivery, Drone Delivery, Risks, legal frame work, Comparison.

1. Introduction

The Internet has enabled most companies in Russia to provide a giant catalog of goods and services through adapting to a strategy of having online stores with virtual products that far exceeds what a physical local store could accommodate [2] hence driving down storage costs at the physical location and increase on their consumers' base. About 70% of the population in Russia amounted to around 146.3 million people are internet users, making Russia Europe's number one in terms of internet users [3] and 1.2 per capita are smart phone users. In 2016, Russian e-commerce market raised to approximately \$16.3 billion for physical goods alone, including an estimated \$4.3 billion for foreign e-commerce sales up to 26% by value and 80% by number of parcels and small packages mainly from China [4]. The market estimates were speculated to top \$17.1 billion in 2017 according to (AKIT) Association of Online Retail Companies. Consumers in search of affordable products, a large customer choice base, want to save time and have a greater possibility of saving money have turned to online retailers like Ulmart.ru, Wildberries.ru, Mvideo.ru, AliExpress and Avito.ru among others to delivery desired goods to on their door step.

With the growth of Internet sales, there is growth in the delivery industry. Foreign online shopping companies rely on third parties (private carriers) like Courier service Express, DHL, Four sides, Express.ru, CPCR –Express and Pony Express among others to delivery customers' goods to their door steps. Whereas the Russian local online shopping companies offer their own delivery means to the customer's location and don't rely on any third party company. Either way for both local and foreign online companies, last mile delivery is a core stage in delivery process. Considering all the phases from customer's order to home delivery by seller, logistics providers and transportation companies have found the last mile delivery to be the most complex and incur the highest cost [5].

2[] Applin, S. A. (2016). Deliveries by Drone: Obstacles and Sociability. In *The Future of Drone Use* (pp. 71-91). TMC Asser Press.

3[] Timofeeva, A. (2017). E-commerce market research and strategy recommendations.: Case study: Russian Post North-West macro-region business unit in Saint-Petersburg.

4[] Khare, A. (2016). Consumer shopping styles and online shopping: An empirical study of Indian consumers. *Journal of Global Marketing*, 29(1), 40-53

5[] CBINSIGHTS. (March 30, 2017). Automating The Last Mile: Startups Chasing Robot Delivery By Land And Air <https://www.cbinsights.com/research/autonomous-drone-delivery-startups/>

Existence of major challenges like poor infrastructure, harsh climate (winter) which makes some roads impassable and geographical location of customers, accounts for the high cost incurred in the last mile delivery. This has made companies to anticipate a reduction in transportation costs by using drones for delivery [6]. As drone technology is also penetrating in consumer market with its ability to traverse difficult terrains, reduce labor, and replace fleets of vehicles [7] it is seen as one of the best possible solution to challenges faced in the last-mile delivery. Drone technology has the potential to significantly reduce the delivery costs and save time required to deliver packages and is less expensive to maintain, not limited by established infrastructure such as roads and generally involves less complex obstacle avoidance scenarios as compared to the traditional delivery vehicles such as trucks [8]. There is a perception there will not be any need to make frequent stops on a route since delivery drones will provide even faster direct service [9] as packages will no longer have to be individually delivered by hand from a truck that is bound by the traffic rules and patterns [1]. This idea is so alluring that large companies have embarked on a journey to develop a model to enable them deploy drones in the last mile delivery.

2. Drone delivery testing

A series of drone testing for commercial delivery have been and still going on for quite a long time dating back in 2012, when Silicon Valley startup Tacos [10] made headlines as it publicly announced plans for the delivery service of Tacos within the city of San Francisco via unmanned aerial vehicles

6[] D'Andrea, R. (2014). Guest editorial can drones deliver?. *IEEE Transactions on Automation Science and Engineering*, 11(3), 647-648.

7[] Haidari, L. A., Brown, S. T., Ferguson, M., Bancroft, E., Spiker, M., Wilcox, A., ... & Lee, B. Y. (2016). The economic and operational value of using drones to transport vaccines. *Vaccine*, 34(34), 4062-4067.

8[] Dorling, K., Heinrichs, J., Messier, G. G., & Magierowski, S. (2017). Vehicle routing problems for drone delivery. *IEEE Transactions on Systems, Man, and Cybernetics: Systems*, 47(1), 70-85.

9[] Limer E (2015) Amazon says its drones will deliver in 30 minutes or less. *Popular Mech.* <http://www.popularmechanics.com/flight/drones/a16074/amazon-drones-30-minutes-or-less/>. Accessed 20 Sept 2015.

10[] Gilbert, J. (2012). Tacocopter aims to deliver tacos using unmanned drone helicopters. *The Huffington Post*.

(UAVs), In 2013, Amazon [11] with a proposal of prime air that could deliver packages to customers in just 30 minutes. In 2013, Deutsche post DHL [12] a logistics company in Germany also started its Parcelcopter project. In June 2014, a Russian company Dodo Pizza [13] became the first to make a trial deployment of a drone in the last mile delivery. In March 2016, the largest convenience chain 7-Eleven [14] and a drone startup Flirtey, made a drone delivery in Reno, Nevada making it the first one to be approved by the aviation officials (FAA). In April 2016, a Japanese eCommerce giant Rakuten [15] made a test service delivery of golf balls and refreshments using a drone on request via phone by players on a golf course in Japan's Chiba prefecture. In September 2016 an American based logistics company UPS [16] tested a medical supply drop to an island off the coast of Massachusetts; in the same month, Alphabet Inc's drone delivery initiative, project wing sent burritos to students at Virginia tech.

In November 2016, Flirtey and Domino's Pizza Enterprises Ltd [17] delivered pizzas from Domino's stores to select customer homes in New Zealand as part of Enterprise's ongoing drone delivery testing. Since mid-March 2017, Swiss Post [18] has successfully been conducting drone flights in Lugano testing transportation of laboratory samples between two Ticino

11[] Woolf, N., & Gibson, S. (2016). Amazon to test drone delivery in partnership with UK government. The Guardian.

12[] Scott, J., & Scott, C. (2017, January). Drone delivery models for healthcare. In Proceedings of the 50th Hawaii International Conference on System Sciences.

13[] LENTA.RU. (June 25, 2014). Dial-a-drone! Syktyvkar pizzeria begins unmanned deliveries, https://www.rbth.com/news/2014/06/25/dial-a_drone_syktyvkar_pizzeria_begins_unmanned_deliveries_37709.html

14[] Widener, M. N. (2016). Local Regulating of Drone Activity in Lower Airspace. BUJ Sci. & Tech. L., 22, 239.

15[] Reuters. (April 26,2016). Japan's Rakuten Demonstrates "First Commercial Drone Delivery Service in the World" <http://toyokeizai.net/articles/-/115632>

16[] Bamburly, D. (2015). Drones: Designed for product delivery. Design Management Review, 26(1), 40-48.

17[] Flirtey. (Nov 15, 2016). Flirtey Launches World's First Pizza-By-Drone Commercial Trials, Delivers Domino's Pizza to Customer Homes. <https://www.prnewswire.com/news-releases/flirtey-launches-worlds-first-pizza-by-drone-commercial-trials-delivers-dominos-pizza-to-customer-homes-300363785.html>

18[] Swiss Post. (Mar 31, 2017). Swiss Post drone to fly laboratory samples for Ticino hospitals Communication dated <https://www.post.ch/en/about-us/company/media/press-releases/2017/swiss-post-drone-to-fly-laboratory-samples-for-ticino-hospitals>

hospitals. In June 2017, Russia's largest savings and loan bank Sberbank [19], successfully test delivered cash from their cash handling center to a cash-in-transit van and the bank has plans to carry out it prior deliveries in Kazan, according to its deputy chairman, Stanislav Kuznetsov. The list is endless for all the companies in different countries which are already testing and others planning to.

Despite the struggle to develop the drone technology for commercial use, the negative impacts that emerge as a result of adaption of the technology have alarmed the authorities raising concern on a number of issues of which privacy and safety are the major pressing ones. Hence the need to answer some questions first; should the technology be permitted at all? Should the society permit the development of a technology likely to so threaten its privacy? Sociability is crucial when automating a social system and drone technology is no exception in order to negotiate and navigate crowded airspace [1].

If the development of the technology is unstoppable, then is it controllable with well-established regulatory framework where only authorized individuals or officials can use it for socially acceptable applications? [20] This paper aims at exploring the potential of delivery drones in Russia, examining issues that encompass aspects of receiving packages in a new way within established communities while putting much emphasis of the current legal frame work.

2.1 SWOT Analysis of drone technology

SWOT analysis focusing on the weaknesses and threats of the technology since that is what the regulators focus on as core issues while regulating.

2.1.1 Weaknesses

- Compete against human based
- Unclear system of delivery
- High startup and Unsure costs of asset maintenance including the

19[] Sputniknews. (June 16, 2017). 'Big Day': Russia's Sberbank Successfully Tests Drone to Deliver Cash <https://sputniknews.com/science/201706161054695960-russia-sberbank-drone/>

20[] Wright, D. (2014). Drones: Regulatory challenges to an incipient industry. Computer law and security report, 30(3), 226-229.

downtime for repairs ^[21]

- Flight regulations are limited
- Public availability; Drones created for criminal purposes
- Limited Altitude and distance
- Legal fees
- Limited payload
- Limited area of coverage

2.1.1 Threats

- Accidents, Collisions with passenger plane
- Lawsuits
- Society de-legitimization
- Unknown various costs, such as Licensing fees, taxes
- Restrictions from regulators ^[23]
- Research and Development funding is very constrained and limited ^[22]
- Hacking into software ^[23]
- Challenging weather conditions (winter, storm, strong wind, rain hence reducing navigation sight) always have a tendency to delay flights and operations ^[23]
- Theft of the aircraft
- Counter-measures against drones include:
 - ◊ jamming of control signals and data transmission
 - ◊ interference with geo-location data, such as the GPS data reaching the drone (BBC, 2012)
 - ◊ ground based interdiction of the drone
 - ◊ predator drones
 - ◊ defensive drone swarms
 - ◊ interference with the infrastructure on which remote pilots and facilities operators depend

21[] Corey Rich, (2015). Unmanned Aerial Vehicles and the Future of Asset Management.

22[] Wong, K. C. (1997). Unmanned Aerial Vehicles (UAVs)-Are They Ready This Time. Are We.

23[] Kamkar, S. (2013). SkyJack: autonomous drone hacking. Online]. <http://samy.pl/skyjack>.

2.2 Table 1: PESTLE Analysis for drone technology

This analysis provides a basis to understand how the changing of these factors influences the development of the technology [24].

Political	Economical
<ul style="list-style-type: none"> Government stability 	<ul style="list-style-type: none"> Fast, save time and resources Employment creation Increase in GDP Automatization Less consumer spending Low production costs
Socio-cultural	Technological
<ul style="list-style-type: none"> Negative perception by society (fear of the unknown). Psychological image as weapons or intruders. Public safety Loss of jobs Need of drone knowledge 	<ul style="list-style-type: none"> E-commerce (AliExpress, Avito.ru). New innovations and discoveries Expanded logistics network Investment in Research and development (military purpose). Reliability of the technology Technology has hidden costs Competition in R&D (research and development) is evolving quickly: new players are emerging every day. Improvement of complementary technologies to address specific needs: planting trees, shipping things (books to pizza), sensors (for precision agriculture).
Environmental	Legal
<ul style="list-style-type: none"> Eco-Friendly Eco-taxes Drones are also used for environmental purposes. Harsh Russian climate (winter, strong winds and storm). 	<ul style="list-style-type: none"> Aviation laws Privacy and Safety laws Drones are not authorized in a lot of places. Partnerships with governments are developing. Legal applications are still work in progress in Russia. Drones are observed in terms of size, payload, their power, and capabilities among other elements.

24[] Johnson, G., Scholes, K., & Whittington, R. (2008). Exploring corporate strategy: text & cases. Pearson Education.

Table 2: Other Applications of drone technology by Market Category

Asset Management	Aerial Surveying	Cinematography	Video Marketing	Other
Power line Inspections	Forestry Management	Movies	Real Estate	Fire Scene Inspections
Railway line inspections	Geophysical Surveys	Documentaries	Tourism Destinations	Insurance Claims
Oil Pipeline Inspections	Land Use Planning	News	Property Development	Crash Scenes
Wind Turbine Inspections	Mapping	Sporting Events	Commercials	Monitoring Marine Animals
				Agriculture
				Anti-Pirate Operations
				Border Controls
				Flood Documentation
				Research

Source: Unmanned aerial vehicles and the future of asset Management by Corey Rich 2015

Drone technology has a wide range of application of which some are still yet to be realized. The table above shows some of other applications of drone technology grouped in respective categories apart from delivery of packages or parcels.

3. Legitimation

There must be a social acceptance of an innovation by relevant actors ^[25]. The new technology “needs to be considered appropriate and desirable by relevant actors in order for resources to be mobilized, for demand to form, and for actors in the new technological innovation to acquire political

25[] Randelli, F., & Rocchi, B. (2015). Analysing the role of consumers within Technological Innovation Systems towards sustainability: the case of Alternative Food Networks (No. wp2015_03. rdf). Università degli Studi di Firenze, Dipartimento di Scienze per l'Economia e l'Impresa.

strength” [26]. Companies can and are ready find ways to work through the technical limitations and the financials so as to achieve their desired goal of using drones for delivery. But what they cannot work around is legal framework on drones set by the regulators [27].

3.1 Regulatory framework

Some countries have highly restrictive regulatory frameworks whereas others are , some have are far less constraining, and some have very limited existing law s and regulations that affects drones and their operation and use.

There are several interrelating perspectives, and changes to achieve the intended ends, which may not be in a single dimension one problem and one solution. Legal regulators must understand the relationship between the interrelating perspectives prior to establishing new laws governing commercial drone operation.

3.1.1 Load delivery

There is need to define exactly what may and may not be delivered by a drone. Despite all the possible positive ways of using the technology, it can also be used for hostile load-delivery since it also offers prospects as a means of perpetrating violence, in a number of ways like:

- carriage of contraband [28] (like pistols, drugs, missiles)
- delivery of explosives and inflammable materials (bombs)
- use of the drone itself as a guided weapon (pilotless)
- interdiction of other aircraft’s flight paths (attack swarms)

Hence drone applications must be regulated and consequences clearly elaborated in case of violation.

3.1.2 Surveillance

26[] Bergeek, A., Jacobsson, S., Carlsson, B., Lindmark, S., & Rickne, A. (2008). Analyzing the functional dynamics of technological innovation systems: A scheme of analysis. *Research policy*, 37(3), 407-429.

27[] Lotz, A. (2015). Drones in Logistics: A Feasible Future or a waste of effort.

28[] Matyszczyk C (2014b) Drone crashes trying to deliver drugs to jail. CNET. <http://www.cnet.com/news/drone-crashes-trying-to-deliver-drugs-to-jail/>.

Surveillance and privacy; Drones carry video cameras to allow the remote pilot to fly them giving an opportunity to any individual engaging in persistent surveillance at the expense of others without even being detected by the person being invaded. [29]

So regulators must set boundaries from which drones are allowed to operate.

3.1.3 For whom

Government agencies like Law enforcement agencies, emergency services agencies, Media organizations, Communities, individual hobbyists, organized crime entities, and individual criminals too can use drones. Drone operations require expertise, skill and focus, and shortfalls against any of those requirements create risk of harm not only to the drone, but also to individuals and objects in its vicinity [31].

So regulators must set standards in terms of requirements that clearly state who is legible to operate drones and their limitations.

Table 3: Shows commercial drone laws and regulations in different countries against Russian laws

	Australia [1]	Canada [2]	UK [3]	China [4]	France[5]	USA [6]	Russia [7]
Regulatory body	Civil Aviation Safety Authority (CASA)	Transport Canada (TC)	Civil Aviation Authority (CAA)	Civil Aviation Administration of China (CAAC)	Directorate General for Civil Aviation (DGAC)	Federal Aviation Administration (FAA)	The Federal Air Transport Agency (FATA)
Maximum Height	-Controlled airspace- 120m / 400ft -Outside -No limit	Max. 300ft	Max. 120m / 400ft > 120m / 400ft approval required	Max. 120m / 400ft > 120m / 400ft approval (CAAC)	Max. 150m / 492ft > 150m / 492ft approval required	121m / 400ft	Not specified
Maximum Take-Off Weight	< 2kg / 4.4lbs > 2kg / 4.4lbs	< 25kg / 55lbs > 25kg / 55lbs permission required	Not specified	0<1.5kg, 1.5<=4kg, 1.5<=7kg, 7<=25kg, 15<=116kg, 25<=150kg >5,700kg (agricultural)	25kg / 55lbs	< 25kg / 55lbs > 25kg / 55lbs permission required	30kg / 66lbs

29[] Clarke, R., & Moses, L. B. (2014). The regulation of civilian drones' impacts on public safety. Computer Law & Security Review, 30(3), 263-285, Table 2.

SMART BUSINESS MODELS IN THE WORLD ECONOMY

Beyond VLOS flights	Allowed for specific after "vigorous risk assessment"		Not allowed and drone must remain within 1640feet of pilot	Not allowed	Allowed with first person view	Not allowed	Not allowed
Competence Statement / License	< 2kg / 4.4 lbs = Registration required > 2kg /4.4lbs = Operators certificate + RPA required Commercial flight- 5 days notice.	>1kg ≤25kg Required (Urban)	>20kg- ≤150kg CAA license required	<250 g/.55lbs -Real name registration >7kg/15lbs- <116kg (CAAC) license	Required	>0.55lbs Required	<30kg- Not required >30kg -Required
Night Times and bad weather	Special Approval	Not allowed	Special Approval	Special Approval	Special Approval	Special Approval	Not allowed and a watcher required
Labeling Requirements	Not required but recommended	Not required	Not required but recommended	Not required	Not required	Required	Required
Air traffic control Notification	Required in controlled airspace	>4lbs -Required	> 15lbs -Required in controlled airspace	Required	Required in controlled airspace		Required
Drone Liability Insurance	Not required but recommended	Required, \$100,000	Not required But highly recommended	Not required	Always required	Not required but recommended	Required
Pilot/ Operator certification	<4lbs None >4lbs Requires manufacturer conducted training course	Above 18 years of age -Ground school	Training (commercial)/ basic certificate for sUAS and ground school	<116kg, required	Knowledge of airspace restrictions	Above 16 years of age	Required
Yield way to manned flights	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Drone Ban Zones	-State institutes -Federal authority constructions -Regional authority constructions -Airport control zones (CTR) -Vehicles, Boats, Buildings, People Hospitals -Operation sites of police, military, search- and rescue forces	-State institutes -Federal authority constructions -Regional authority constructions -9km from Airport control zones (CTR) -Minimum 150m/500ft from crowds and 90m from built up areas hospitals -Operation sites of police, military, search and rescue forces	-State institutes -Federal authority constructions -Regional authority constructions -Airport control zones (CTR) -Minimum 150m/500ft from crowds and built up areas hospitals -Operation sites of police, military, search and rescue forces	-State institutes -Federal authority constructions -Regional authority constructions -Airport control zones (CTR) -Crowds of people Hospitals -Operation sites of police, military, search- and rescue forces *DJI drones- programmed not to take off in No-fly zones.	-State institutes -Federal authority constructions -Regional authority constructions Airport control zones (CTR) National Parks Crowds Private Property (only with permission of the owner) Hospitals -Operation sites of police, military, search- and rescue forces -Allowed only in; Unpopulated, Uninhabited, Populated and densely populated areas.	-State institutes; Washington -Federal authority constructions -Regional authority constructions -Airport control zones (CTR) -Crowds of people (not specified) Hospitals -Operation sites of police, military, search- and rescue forces	-State institutes; Moscow kremlin, Red Square -Federal authority constructions -Regional authority constructions -Airport control zones (CTR) -Crowds of people -military installations, power plants
Non-Compliance		Fines \$5,000 - individual to \$25,000 company -SFOC operators; \$3,000 -individual /\$15,000 company					Fines 3,000 rubles (\$83)- individual to 500,000 rubles (\$13,800) - legal entity.

From the table above, Russian drone laws are very much in line with rules in other countries, with only a few unique stand-out points:

- Drone operators must have a watcher at all times to monitor flight operations which is currently the most standing block which makes it almost impossible to use the technology for delivery.
- Air traffic control must be notified prior to flight with detail flight plan unlike other countries where it is only required in controlled airspace only.
- Drone has to be labeled for the purpose of identification

There seems to be no mention of a specified maximum flight height, but with no doubt, that issue will be addressed and limits will be set.

5. Discussion

Packages are already soaring through the skies in other countries like Zipline in Rwanda dropping blood parcels on parachutes outside remote health centers with full support from the government and SF express in China while companies from different countries are testing restlessly to launch drone delivery services in their respective countries. Moreover in May 2017, JD.com Inc. China's biggest online retailer announced plans to develop one-ton delivery drones or more for long-distance deliveries by 2020 whereas in most of other developed countries like Russia, drone delivery has yet been permitted at all. Hence showing that china's advancement in drone delivery is way beyond as compared to any other country [30]. Drone delivery is currently restricted to only take place in rural and less populated areas in all the countries that permit it as a safety precaution but also a step forward to fully permitting it.

Conclusion

Customer demand and general interest in the technology is growing very fast in spite of a still emerging and uncertain regulatory framework with limited evidence available regarding the impact of drone technology for routine delivery. Determining whether drone technology would be beneficial to last mile is difficult without legal regulations permitting its usage in the logistics chain.

Drone delivery in Russia is yet to be realized and there have been only two official drone tests. Russia is using a strategy of monitoring and studying how other developed countries are handling this technology and then expound on their policies and adopt them as a way of avoiding and minimizing the risks involved since drone technology challenges the existing regulatory system, safety and privacy of Russian citizens, security of the entire Russian Federation, and creates the uncertain landscape for new business models.

30[] Shoshanna Delventhal. (May 23, 2017). JD.com Plans Drone Capable of Delivering One Ton by 2020. <http://www.investopedia.com/news/jdcom-plans-drone-capable-delivering-one-ton-2020/#ixzz4xllBa0P5>.

Sberbank's break through on delivery using drones; will have a big impact in determination of the future of drone technology in logistics sector in Russia. Whether or not Sberbank's project is successful, new regulations regarding the use of drone for delivery have to be drafted. The technical and safety obstacles to flying delivery drones can be overcome. But it is a gradual process involving "lots of data and demonstration" [29] to satisfy regulators. There needs to occur more drone tests by more large companies in Russia like in America as a way of putting pressure on the legal regulators to finding a neutral point of permitting the use of the technology. Drones may ultimately be used to deliver a series of various items ranging from money to carrying network antennas as Facebook's Zark anticipates. 2021 might witness drone deliveries in the last mile as customers order goods online from global sites like Ali express, amazon, Ebay, in cooperation with DHL, Postal.ru, Russian mail and also Fast food deliveries like pizza and deliveries of clothes from local stores to their door step.